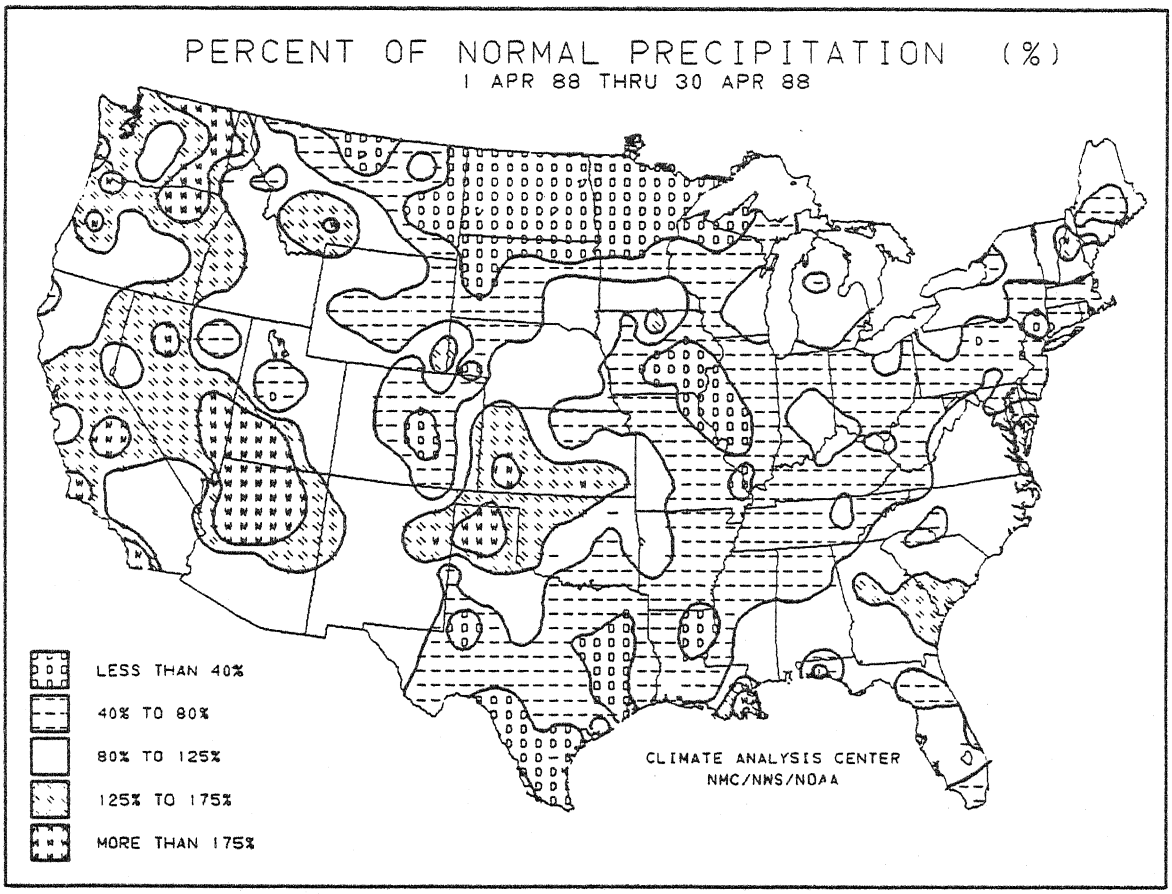
CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

No. 88/19 Washington, DC May 7, 1988



AFTER THREE CONSECUTIVE MONTHS OF WELL-BELOW NORMAL PRECIPITATION, MUCH OF THE WEST AND PARTS OF THE SOUTHEAST MEASURED EXCESS APRIL PRECIPITATION. HOWEVER, LONG-TERM DEFICIENCIES STILL REMAINED IN BOTH REGIONS, AND OTHER AREAS IN THE U.S., NAMELY THE NORTHERN GREAT PLAINS, MIDWEST, AND TEXAS, EXPERIENCED EXTREMELY DRY CONDITIONS IN APRIL. REFER TO THE U.S. MONTHLY SUMMARY FOR FURTHER DETAILS.

NOAA - NATIONAL WEATHER SERVICE - NATIONAL METEOROLOGICAL CENTER

WEEKLY CLIMATE BULLETIN

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This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief, concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

Highlights of major global climatic events and anomalies.
U.S. climatic conditions for the previous week.
U.S. apparent temperatures (summer) or wind chill (winter).
Global two-week temperature anomalies.
Global four-week precipitation anomalies.
Global monthly temperature and precipitation anomalies.
Global three-month precipitation anomalies (once a month).
Global twelve-month precipitation anomalies (every 3 months).
Global temperature anomalies for winter and summer seasons.
Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Center via the Global Telecommunication System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF MAY 7, 1988
(Approximate duration of anomalies is in brackets.)

1. North Central U.S.A. and South Central Canada:
RAINS EASE DRYNESS.
Moderate to heavy rain, as much as 51 mm (2.01 inches), was recorded at some stations; however, the area remained unusually dry [8 weeks].

2. Eastern United States:
BELOW NORMAL TEMPERATURES PERSIST.
Temperatures continued as much as 3.8°C (6.8°F) below normal from Kentucky to Virginia as a cold Canadian air mass dominated the region [4 weeks].

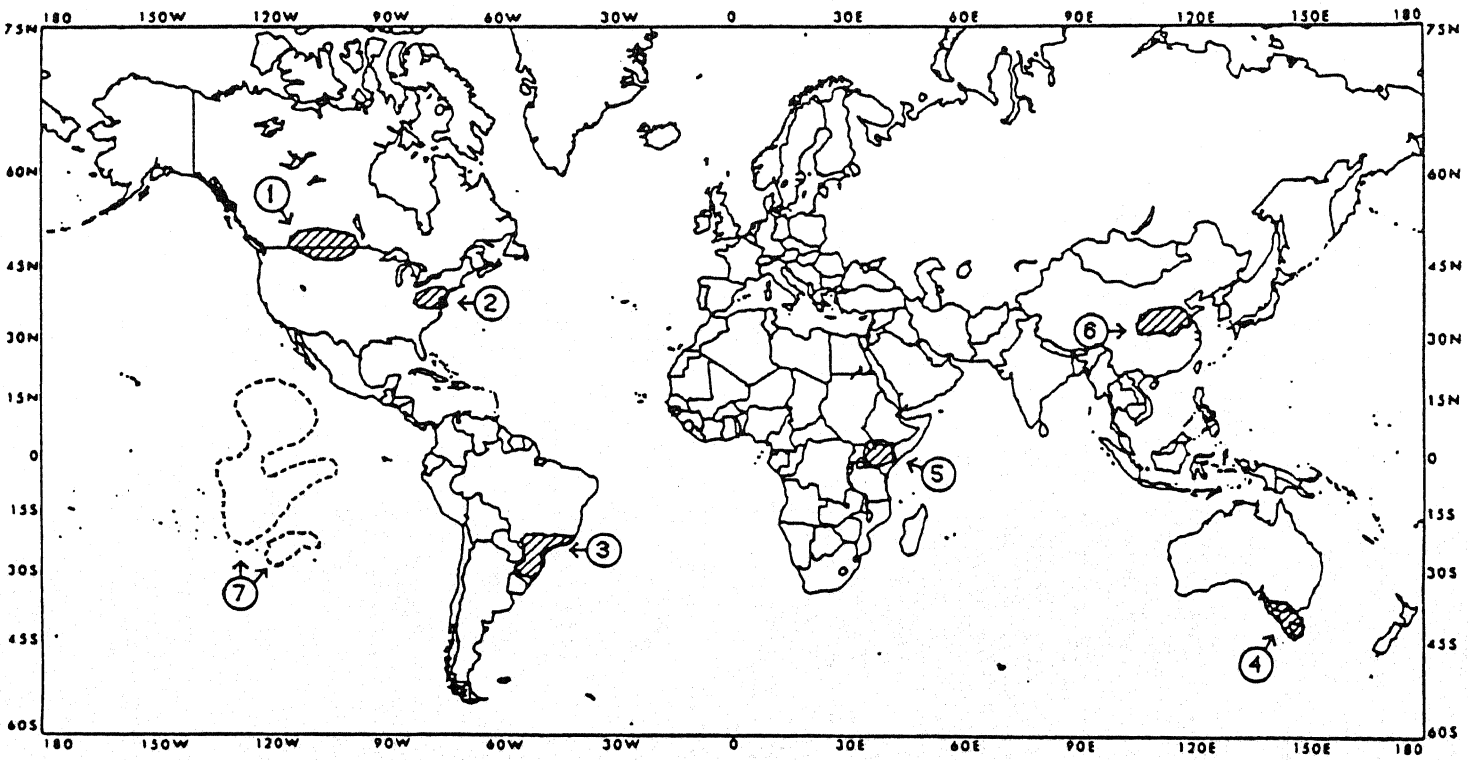
3. Brazil:
ABOVE NORMAL TEMPERATURES DIMINISH.
Cooler air penetrated into southern Brazil bringing temperatures to near normal in most areas. To the north, temperatures remained as much as 3.7°C (6.7°F) above normal [Ending at 8 weeks].

4. Australia:
AUTUMN RAINS ARRIVE; AREA STILL UNUSUALLY WARM.
Moderate precipitation, up to 29.2 mm (1.15 inches), was reported in southeastern Australia; however, temperatures up to 7.1°C (12.8°F) above normal persisted in the area [8 weeks].

5. Kenya:
HEAVY RAINS EASE.
Light to moderate precipitation fell in central and western Kenya with amounts up to 28 mm (1.10 inches) recorded at some locations [6 weeks].

6. East Central China:
HEAVY THUNDERSTORMS RELIEVE DRYNESS.
Precipitation totals approaching 124.4 mm (4.90 inch) were observed in the region as unusually dry conditions eased [7 weeks].

7. Central and Eastern Tropical Pacific:
REFER TO MARCH 1988 EL NINO/SOUTHERN OSCILLATION (ENSO) ADVISORY.
The areas of positive sea surface temperature anomalies above 1°C (1.8°F) have greatly diminished over the past few months. Regions above 1°C (1.8°F) during March 1988 are outlined. Since conditions have returned to near normal no more advisories will be issued [Ended].



Approximate locations of the major anomalies and events described above are shown on this map. See the other world maps in this Bulletin for current two-week temperature anomalies, four-week precipitation anomalies, and (occasionally) longer-term anomalies.

U.S. WEEKLY WEATHER HIGHLIGHTS

FOR THE WEEK OF MAY 1 THROUGH MAY 7, 1988

Heavy precipitation was scattered across the nation last week as significant rainfall was limited to portions of the Pacific Northwest coast, the central Great Plains, the mid-Atlantic, extreme southern Florida, and the Hawaiian Islands (see Table 1). According to the River Forecast Center and the National Weather Service, maximum totals were 2.8 inches at Hilo, HI, 3.8 inches at Key West, 4.4 inches along coastal Oregon, 5.8 inches in north-central Virginia, and 6.5 inches in northwestern Kansas. Light to moderate amounts fell on northern California and the Pacific Northwest, the northern halves of the Rockies and Great Plains, from Missouri eastward to the Carolina coasts, and from the eastern half of Florida northward into Maine. The rainfall in the northern Great Plains was the first substantial precipitation this Spring and provided some short-term relief from the area's abnormally dry conditions. Little or no precipitation occurred in southern California, the Southwest, and parts of the Great Basin, across much of the southern third of the Rockies and Great Plains, where central Texas has failed to receive any meaningful precipitation over the past few months, along the Gulf Coast from Texas to Florida, and in the Midwest and Great Lakes regions, which have also become unusually dry over the past five weeks.

Below normal temperatures persisted in the eastern U.S. for the fourth straight week, while much of the southern and western parts of the country also experienced cooler than normal weather. Greatest departures below normal (between -8 and -11°F) were concentrated in the interior sections of California and the Pacific Northwest, the Great Basin states, and in northern Florida (see Table 2). Several stations scattered across the West and Southeast established new daily record low temperatures early in the week. Furthermore, temperatures below freezing were recorded at many locations in the West (see Figure 1). In contrast, unseasonably warm temperatures dominated the northern Great Plains and Midwest. Departures of +8 to +14°F were observed in Minnesota, Wisconsin, Iowa, upper Michigan, and the eastern Dakotas (see Table 3), while readings in the eighties extended into south-central Canada (see Figure 1). Elsewhere, portions of northern New England, southwestern Texas, Hawaii, and most of Alaska reported slightly above normal temperatures.

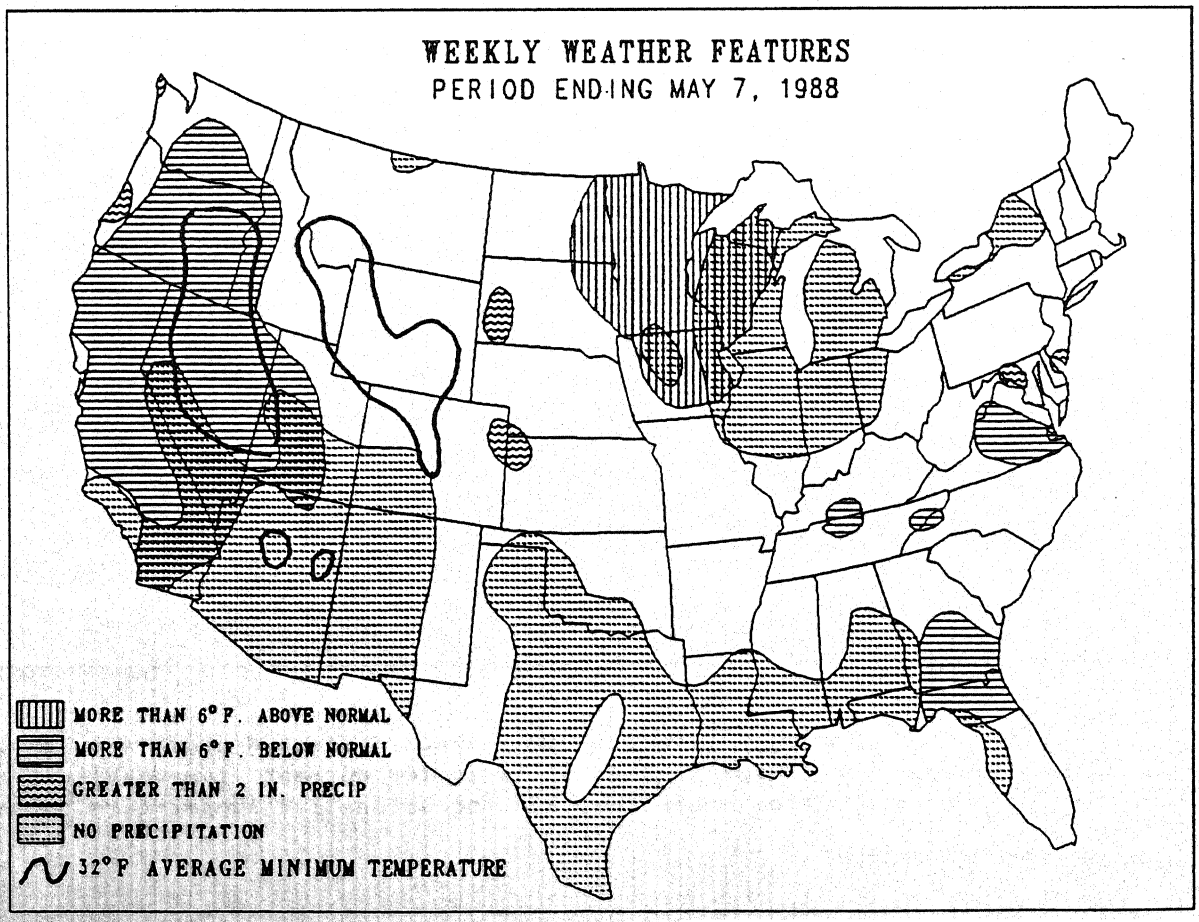


TABLE 1. Selected stations with more than two inches of precipitation for the week.

North Bend, OR	4.44	Martinsburg, WV	2.60
Key West NAS, FL (NQX)	3.76	Lihue, Kauai, HI	2.55
Quillayute, WA	3.10	Washington/Dulles, VA	2.46
Newport News, VA	2.89	Akron, CO	2.34
Hilo, Hawaii, HI	2.79	Goodland, KS	2.23
Hampton/Langley AFB, VA	2.67	Dover AFB, DE	2.13
Key West, FL (EYW)	2.61	Rapid City, SD	2.01

TABLE 2. Selected stations with temperatures averaging greater than 7°F BELOW normal for the week.

Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Redding, CA	-11	55	Ukiah, CA	- 8	52
Blythe, CA	-10	66	Boise, ID	- 8	46
Sexton Summit, OR	-10	36	Elko, NV	- 8	42
Bakersfield, CA	- 9	59	Las Vegas, NV	- 8	61
Daggett/Barstow, CA	- 9	61	Pendleton, OR	- 8	48
Mt. Shasta, CA	- 9	41	Wenatchee, WA	- 8	50
Baker, OR	- 9	40	Imperial, CA	- 8	66
Cedar City, UT	- 9	43	Jacksonville, FL	- 8	65
Caliente, NV	- 9	47	Winnemucca, NV	- 8	44
Ely, NV	- 9	38	Meacham, OR	- 8	38
Delta, UT	- 9	47	Yakima, WA	- 8	47

TABLE 3. Selected stations with temperatures averaging greater than 7°F ABOVE normal for the week.

Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
Alexandria, MN	+14	65	Warroad, MN	+10	58
International Falls, MN	+14	61	Spencer, IA	+ 9	64
Minneapolis, MN	+12	66	Duluth, MN	+ 9	55
St. Cloud, MN	+12	64	Rochester, MN	+ 9	61
Fargo, ND	+11	62	Aberdeen, SD	+ 8	60
Watertown, SD	+11	62	Des Moines, IA	+ 8	66
Kotzebue, AK	+10	36	Mason City, IA	+ 8	62
Hancock, MI	+10	55	Grand Forks, ND	+ 8	59
Eau Claire, WI	+10	63	La Crosse, WI	+ 8	64
Park Falls, WI	+10	60	Wausau, WI	+ 8	59

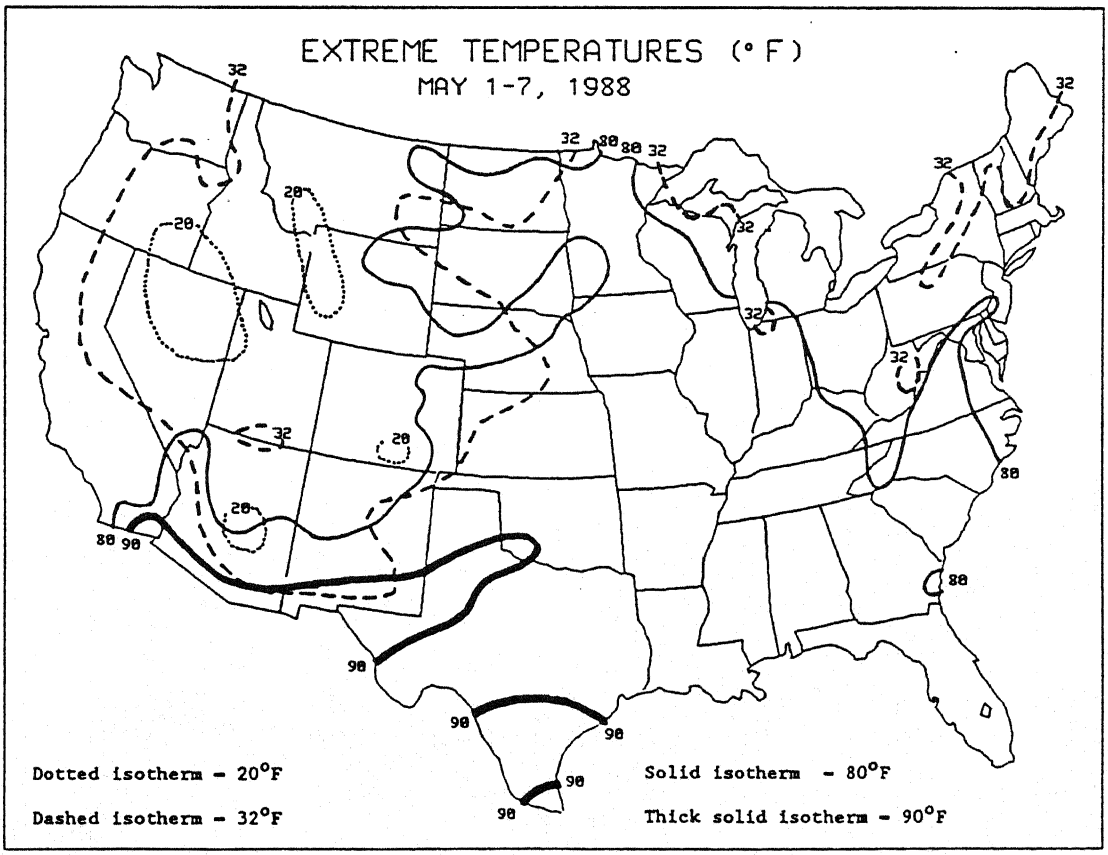
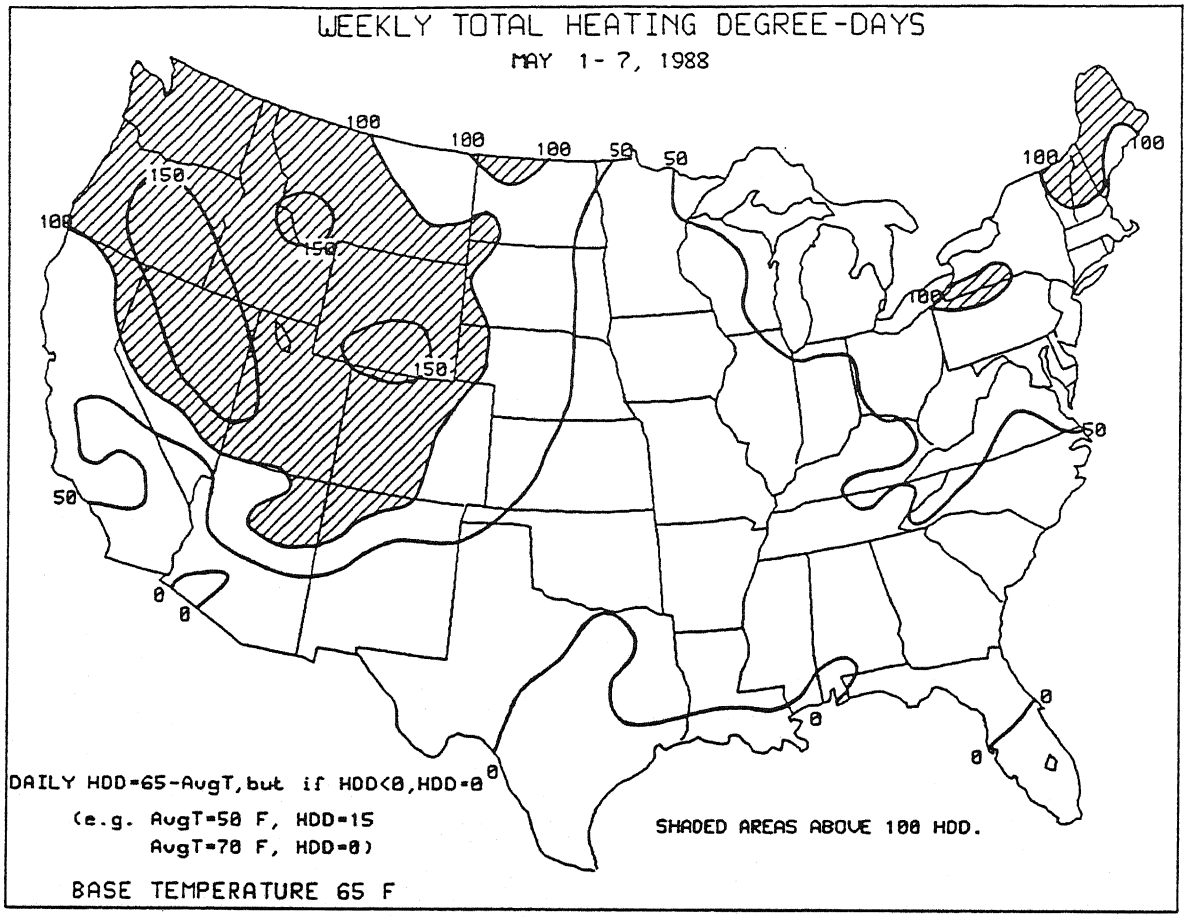
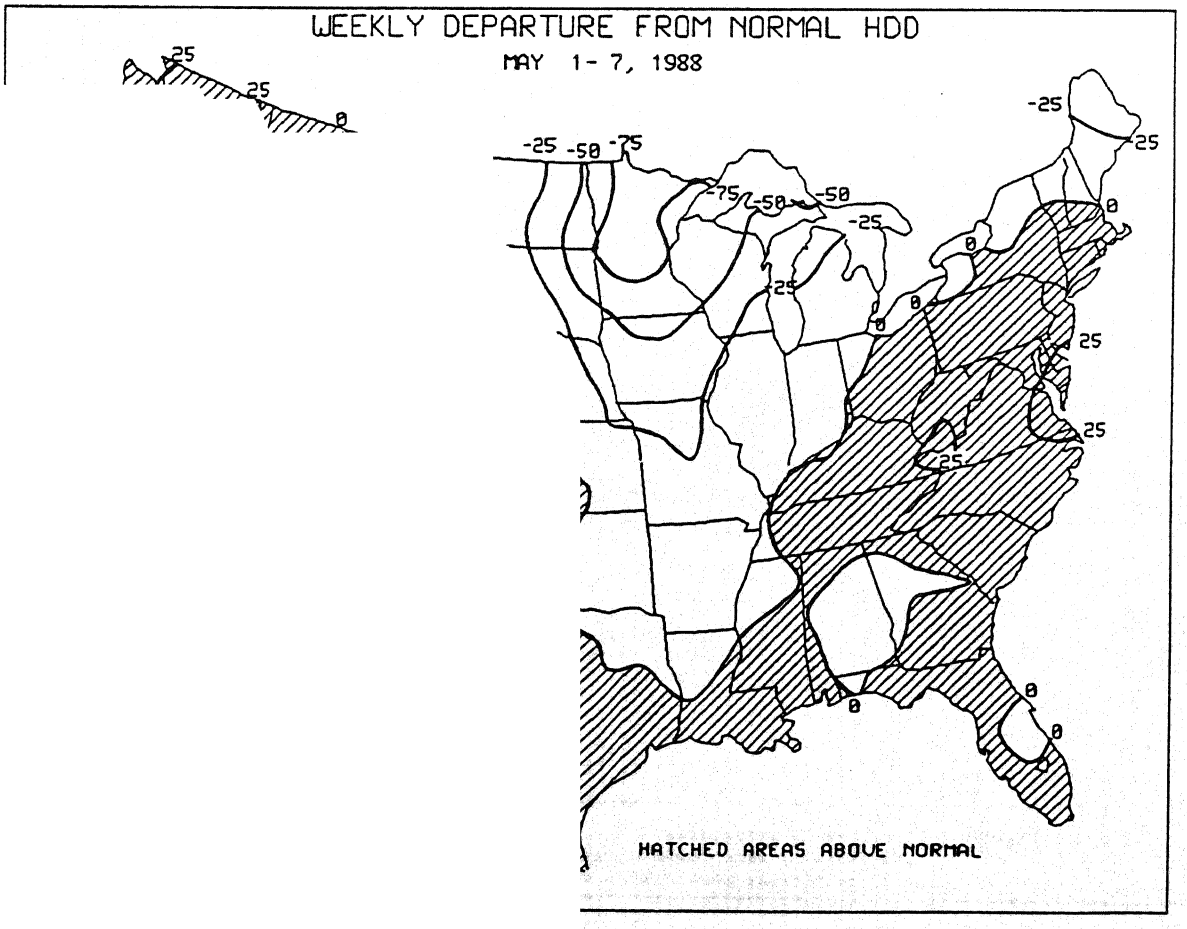


Figure 1. Extreme temperatures (°F) during the week of May 1-7, 1988. Unseasonably warm temperatures covered the north-central U.S., while cold conditions prevailed in the West.

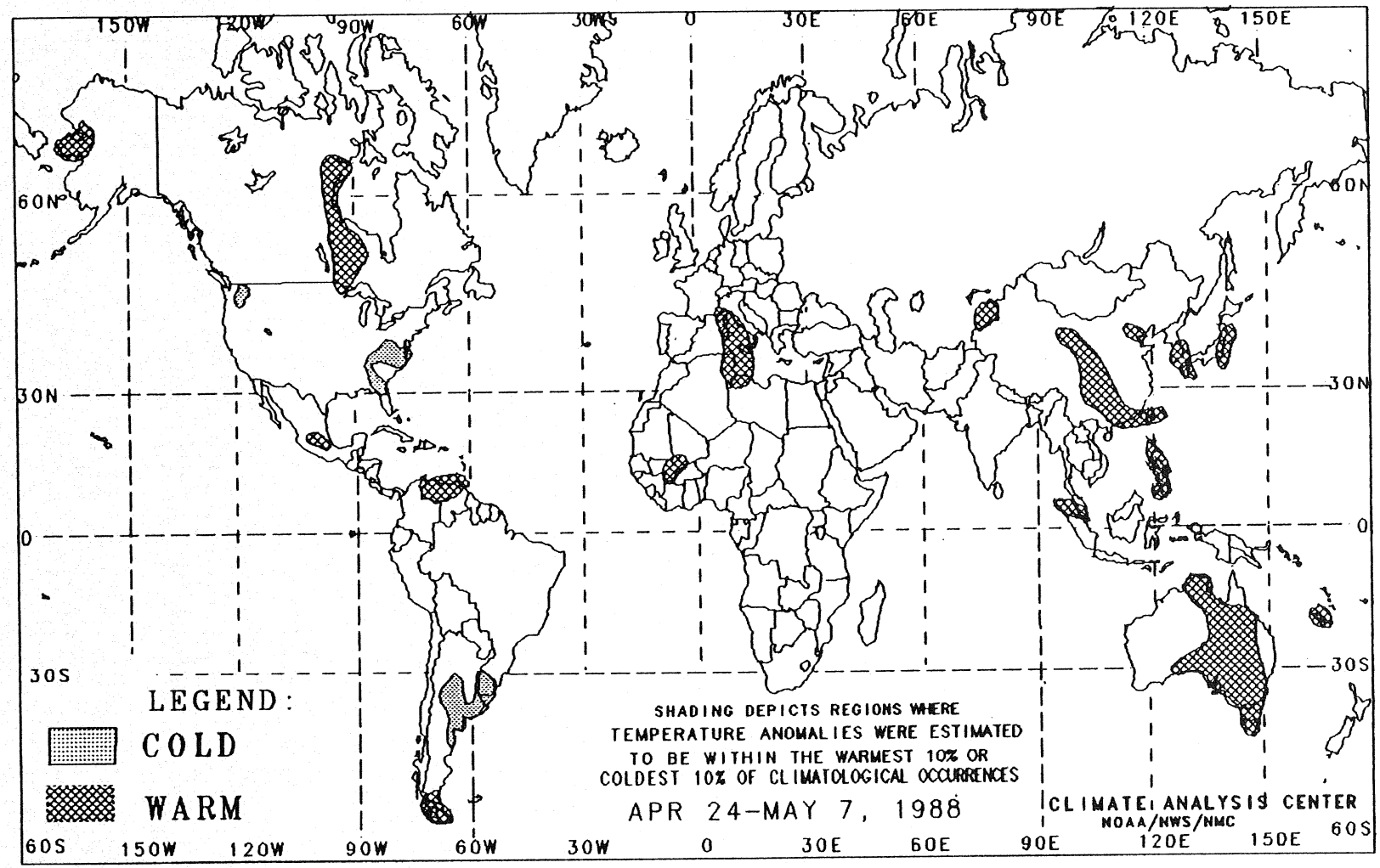


Due to the unseasonably cool weather across much of the U.S. this late into Spring, the weekly Heating Degree Days are depicted instead of the weekly Cooling Degree Days (CDD). Normally, May heralds the start of the CDD charts in the Weekly Climate Bulletin (see WCB dated 4/9/88).



GLOBAL TEMPERATURE ANOMALIES

2 Week



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

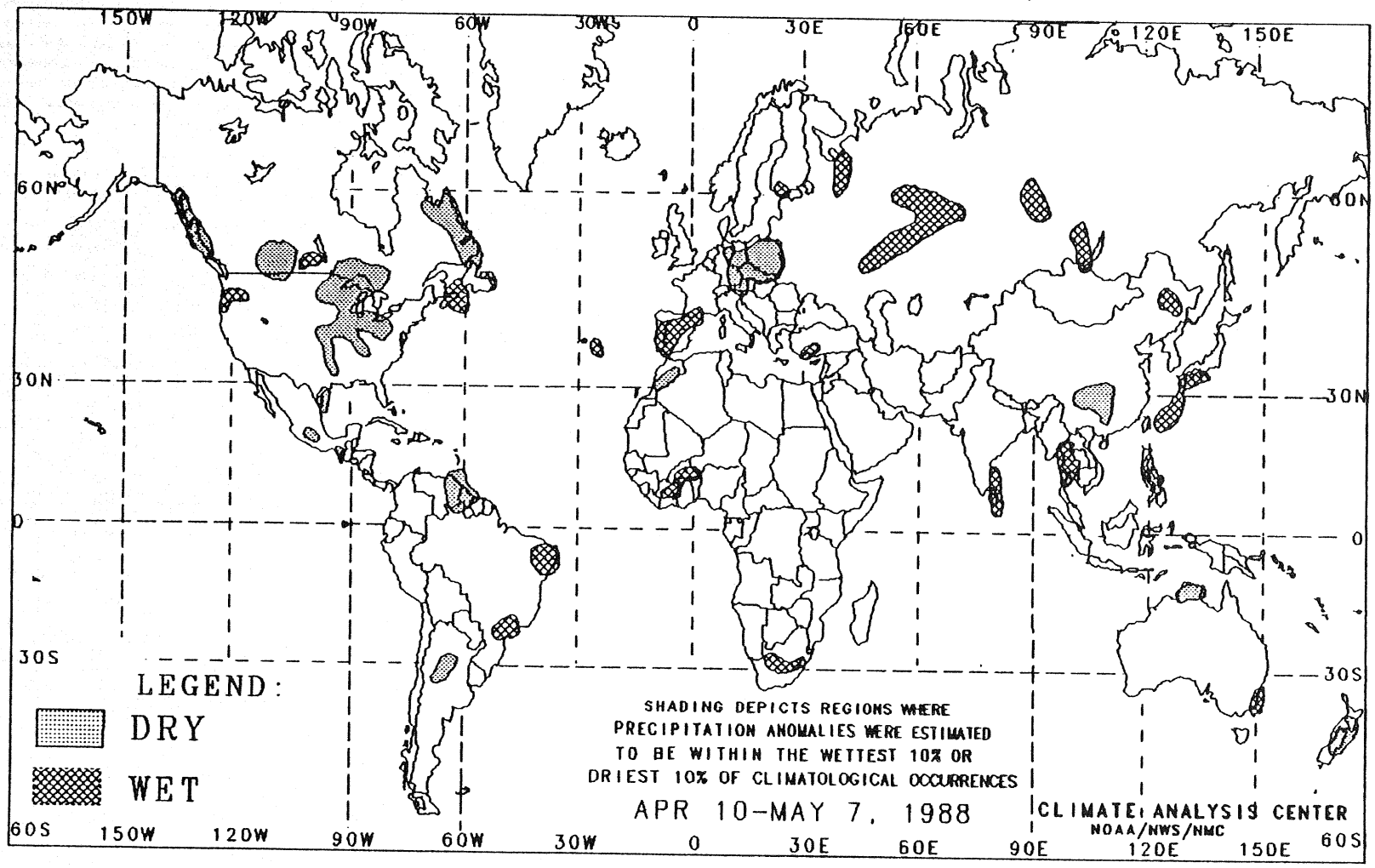
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining precentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 Week



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

Climate Analysis Center, NMC
National Weather Service, NOAA

UNITED STATES CLIMATE SUMMARY FOR THE MONTH OF APRIL 1988

April climate features included above normal precipitation in much of the drought-stricken areas of the western and southeastern U.S., extremely dry conditions in the northern and southern portions of the country, unseasonably warm weather in the western third of the nation, and below normal temperatures in the south-central and eastern United States, especially during the last three weeks of the month.

A significant change in the upper air pattern during April allowed Pacific storm systems, whose eastward progression had previously been blocked by a ridge of high pressure the last two months, to enter the western U.S. continent and drop excess precipitation across much of the West (see front cover and Figure 1). Farther east, parts of the Southeast, from eastern Louisiana northeastward to the Delmarva Peninsula, reported ample April rainfall. However, even with April's beneficial precipitation, large deficits still remained in many locations throughout both regions. Heavy rains during the last week of April brought monthly totals to near normal in New England. Wet conditions returned to south-central Alaska as stations along the Gulf of Alaska recorded over 150% of normal rainfall (see Table 1). In contrast, most of the northern Great Plains, Midwest, Texas, and scattered areas of the Tennessee Valley and central Appalachians received less than half their normal monthly precipitation (see Table 2). Some parts of Montana, North Dakota, Minnesota, and Texas recorded no measurable precipitation (see Table 5), while many more locations totaled less than an inch during April. As a result, these regions have become abnormally dry. Furthermore, deficiencies are rapidly growing since rainfall normally increases during the spring months and reaches a maximum in the summer.

April was the third and fifth consecutive month that temperatures averaged above normal in the West and Alaska, respectively. Largest departures above normal (between +4 and +7°F) were found in the northern Rockies and the Pacific Northwest interior (see Figures 2, 3, and Table 3). Other sections slightly above normal included southern Texas and Florida, northern New England, and the Mississippi Valley. Cooler weather settled into portions of the central and southern Great Plains, and in the eastern third of the nation. Departures of -2 to -4°F occurred in western Kansas and Oklahoma, northern and western Texas, eastern Tennessee, and the mid-Atlantic states (see Table 4). Monthly departures below normal would have been much larger in the latter area if the first week of April had not been so unusually warm, as represented by Figure 4. Record April extreme maximum temperatures were scattered across the country and included stations in Alaska and Hawaii (see Table 6).

TABLE 1. APRIL STATIONS WITH MORE THAN 150% OF NORMAL PRECIPITATION AND MORE THAN THREE INCHES OF PRECIPITATION; OR, STATIONS WITH MORE THAN SIX INCHES OF PRECIPITATION AND NO NORMALS.

Station	Total (in.)	Pct of Normal	Station	Total (In.)	Pct of Normal
Yakutat, AK	16.14	187.4	Augusta, GA	5.04	152.9
Mt. Washington, NH	15.37	219.3	Olympia, WA	4.92	156.9
New Orleans NAS, LA (NBG)	11.26	***	Portland, OR	4.57	200.2
New Orleans, LA (MSY)	9.25	206.6	Mason City, IA	4.53	164.1
Cordova, AK	8.85	153.9	Wichita, KS	4.46	183.6
Moody AFB, GA	6.93	***	Homer, AK	4.08	312.3
Kodiak, AK	6.67	183.1	Flagstaff, AZ	3.83	283.7
Salisbury, MD	5.80	183.4	San Diego/Lindbergh, CA	3.71	488.1
Eugene, OR	5.65	206.5	San Diego, CA (SAN)	3.70	445.3
Valdez, AK	5.26	178.7	Cedar City, UT	3.46	352.6
Galveston, TX	5.22	196.4	Dodge City, KS	3.08	169.3
Savannah, GA	5.05	159.4	Walla Walla, WA	3.03	216.3

(Note: Stations without normals are indicated by asterisks).

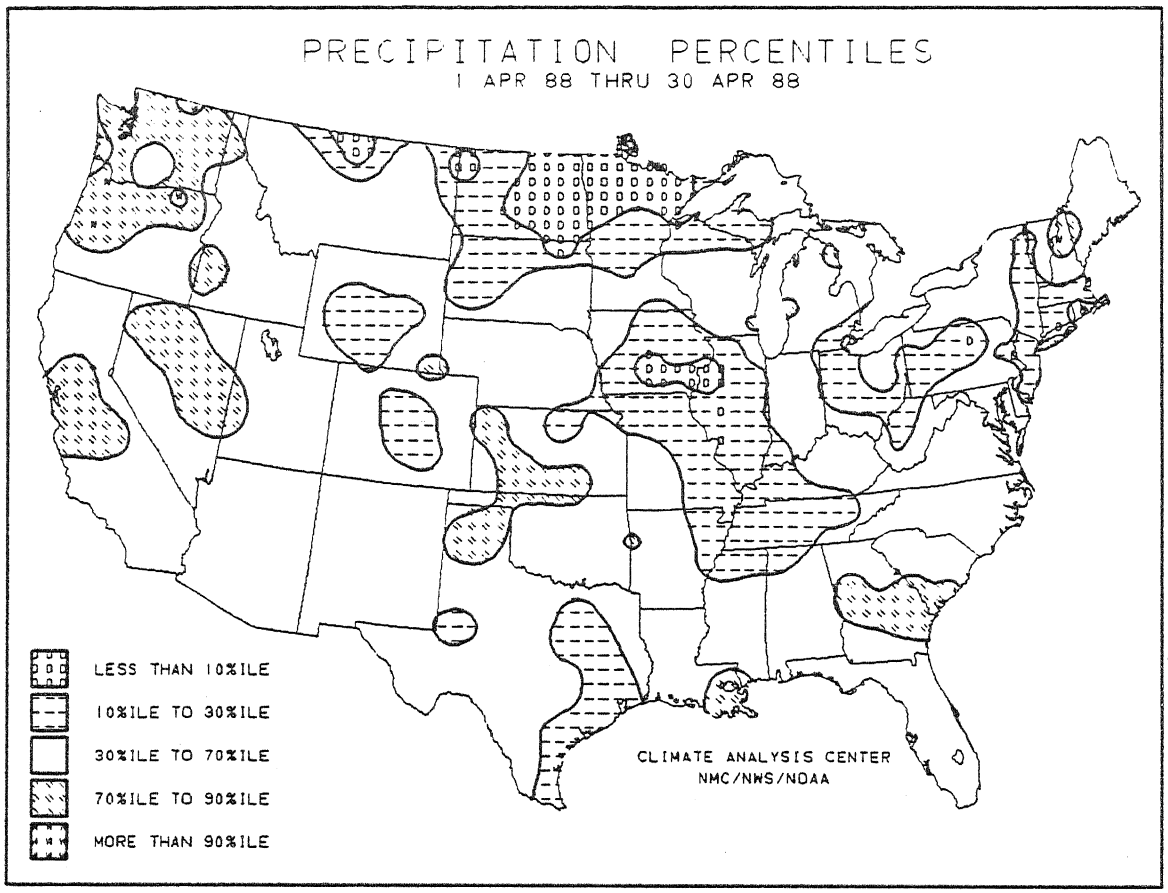


Figure 1. Precipitation percentiles for April, 1988. Statistically dry conditions (less than one in ten years occurrence) existed in North Dakota, Minnesota, and Iowa (areas shaded with "D"), while relatively wet weather covered parts of the West, Southeast, and central Great Plains.

TABLE 2. APRIL STATIONS WITH LESS THAN 50% OF NORMAL PRECIPITATION AND MORE THAN THREE INCHES OF NORMAL PRECIPITATION.

Station	Total (in.)	%of Nml	NmlAmt (in.)	Station	Total (in.)	%of Nml	NmlAmt (in.)
Poughkeepsie, NY	0.58	15.9	3.66	Marquette, MI	1.48	40.8	3.63
Monroe, LA	0.61	12.3	4.95	Detroit, MI	1.50	47.9	3.13
Cedar Rapids, IA	0.72	19.1	3.80	Cape Girardeau, MO	1.54	34.4	4.48
Des Moines, IA	0.75	23.4	3.20	Ottumwa, IA	1.55	44.0	3.52
Burlington, IA	0.76	21.5	3.53	Lufkin, TX	1.58	37.0	4.27
Valparaiso, FL	1.06	19.9	5.31	Longview, TX	1.59	30.7	5.19
Quincy, IL	1.10	28.7	3.84	Bridgeport, CT	1.59	42.8	3.72
St. Louis, MO	1.15	32.6	3.53	Peoria, IL	1.59	41.6	3.82
Houston, TX	1.26	32.6	3.74	Belleville, IL	1.61	42.6	3.79
Williamsport, PA	1.26	35.9	3.52	Waterloo, IA	1.72	48.7	3.54
Springfield, IL	1.27	32.1	3.96	Evansville, IN	1.77	43.4	4.45
Waco, TX	1.28	33.9	3.78	Blytheville, AR	1.79	41.3	4.34
Allentown, PA	1.36	34.8	3.91	England AFB, LA	2.06	37.3	5.53
Moline, IL	1.36	34.4	3.94	Nashville, TN	2.09	46.9	4.45
College Station, TX	1.37	31.6	4.34	Paducah, KY	2.13	46.6	4.57
Toledo, OH	1.45	48.1	3.01	Greenwood, MS	2.52	45.5	5.54
Boston, MA	1.47	39.6	3.70	Memphis, TN	2.85	49.6	5.75

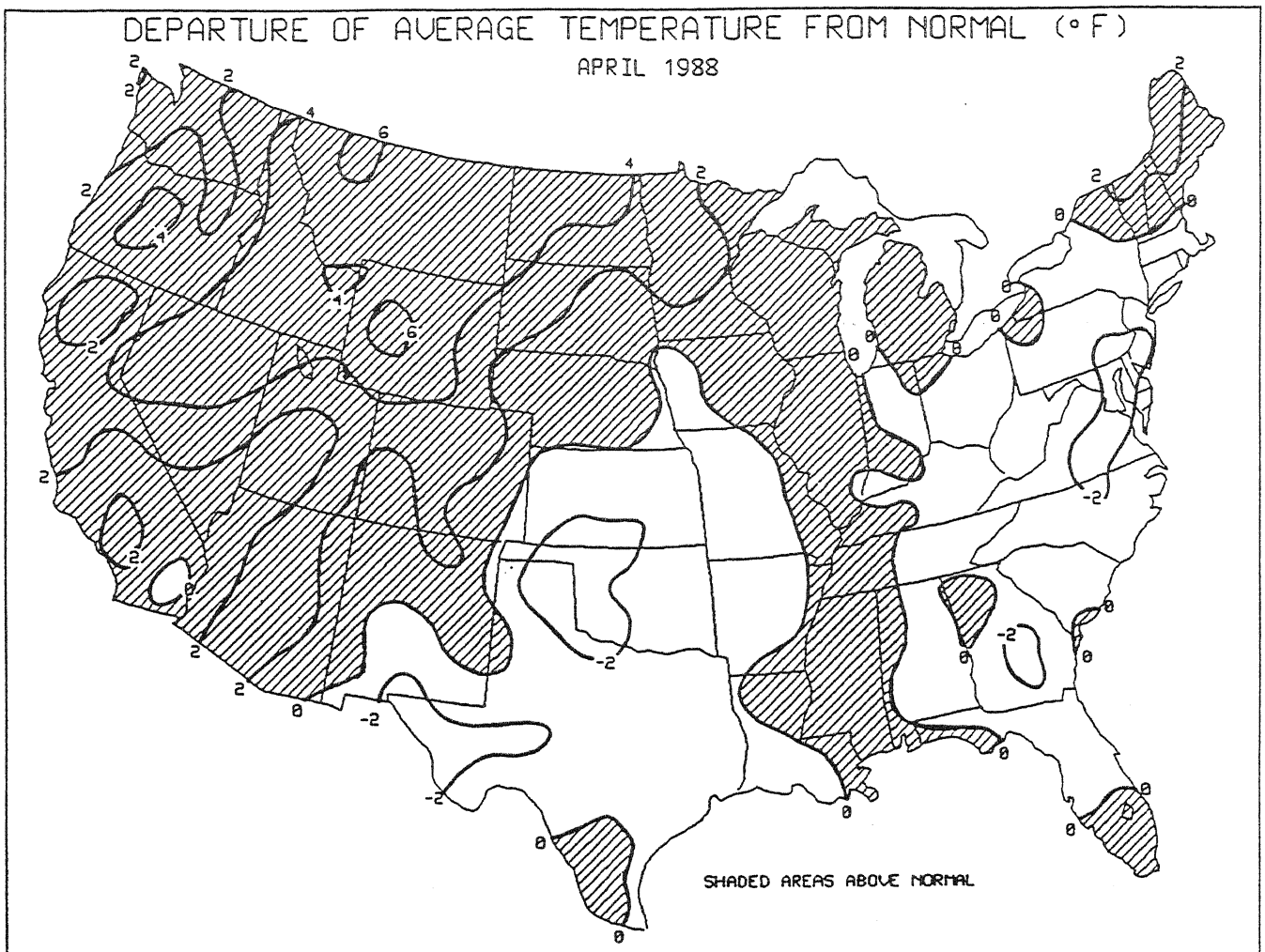


Figure 2. Average temperature departures from normal (°F) during April, 1988. While warm conditions dominated the West and northern Great Plains, cooler weather prevailed in the south-central and eastern U.S.

TABLE 3. APRIL AVERAGE TEMPERATURES 4.0°F OR MORE ABOVE NORMAL.

	Degrees F			Degrees F	
Station	Mean	Dep	Station	Mean	Dep
Cut Bank, MT	45.5	+6.7	Reno, NV	51.3	+4.9
Lander, WY	48.7	+6.5	Kalispell, MT	47.7	+4.9
Omak, WA	54.5	+6.1	Helena, MT	47.1	+4.9
Minot, ND	46.8	+5.8	Nome, AK	22.8	+4.9
Lewiston, MT	45.1	+5.6	Butte, MT	42.3	+4.9
Burley, ID	51.3	+5.6	Oakland, CA	60.6	+4.7
Dickinson, ND	46.8	+5.6	Elko, NV	47.8	+4.5
Worland, WY	50.9	+5.6	Norton AFB, CA	64.6	+4.3
Redmond, OR	48.9	+5.4	Havre, MT	47.3	+4.1
Rock Springs/Sweetwater, WY	45.0	+5.2	Boise, ID	52.7	+4.0
Phoenix, AZ	73.0	+5.0	Jamestown, ND	45.3	+4.0
Kotzebue, AK	17.8	+5.0	San Jose, CA	61.7	+4.0

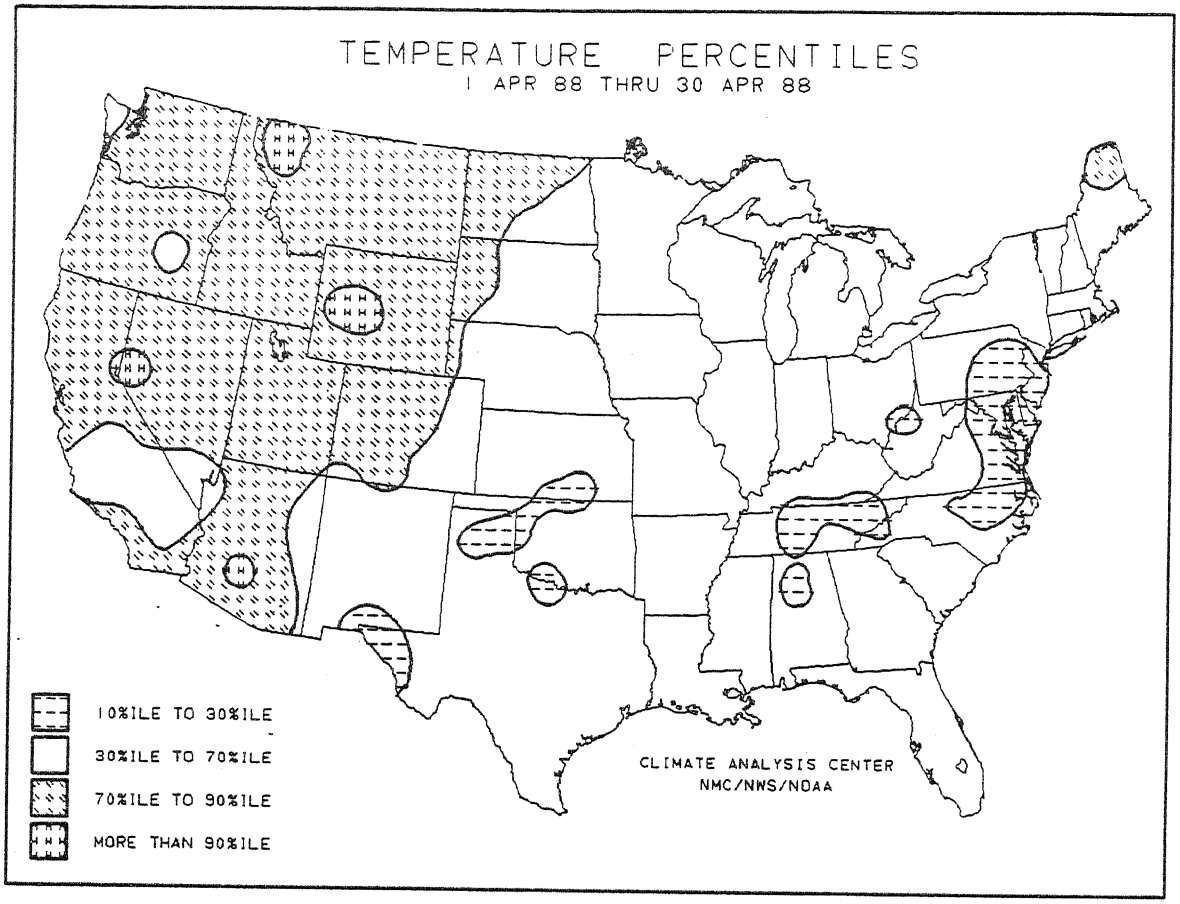


Figure 3. Average temperature percentiles for April, 1988. April temperatures were statistically warmer than 90% of other Aprils based on the normals in portions of northwestern Montana, western Nevada, central Wyoming, and southern Arizona (areas shaded with "H").

TABLE 4. APRIL AVERAGE TEMPERATURES 2.0°F OR MORE BELOW NORMAL.

Station	Degrees F Mean	Dep	Station	Degrees F Mean	Dep
Elkhart, KS	52.0	-3.6	Poughkeepsie, NY	45.5	-2.5
Ft. Sill, OK	59.0	-3.1	Wichita Falls, TX	61.3	-2.3
Patuxent River NAS, MD	51.6	-3.1	Amarillo, TX	54.1	-2.3
Gage, OK	54.5	-3.1	Washington, DC	54.3	-2.3
Trenton, NJ	49.5	-2.9	Wichita, KS	54.0	-2.3
El Paso, TX	61.2	-2.7	Parkersburg, WV	52.0	-2.2
Nashville, TN	57.0	-2.7	Dodge City, KS	52.2	-2.2
Medicine Lodge, KS	55.2	-2.7	Knoxville, TN	57.4	-2.2
McGuire AFB, NJ	49.6	-2.7	St. Paul Island, AK	25.9	-2.2
Harrisburg, PA	49.8	-2.5	Iliamna, AK	28.9	-2.0
Hobart, OK	57.7	-2.5			

TABLE 5. RECORD APRIL TOTAL PRECIPITATION.

Station	Total (In.)	Normal (In.)	Pct of Normal	Record Type
Mt. Washington, NH	15.37	7.01	219.3	HIGHEST
Kodiak, AK	6.67	3.64	183.1	HIGHEST
Marquette, MI (1)	1.48	3.63	40.8	LOWEST
Del Rio, TX (2)	0.12	1.85	6.5	LOWEST
Fargo, ND	0.01	1.88	0.5	LOWEST
Havre, MT	Trace	1.18	0.0	LOWEST
Dickinson, ND	Trace	1.71	0.0	LOWEST
Jamestown, ND	Trace	1.52	0.0	LOWEST
Grand Forks, ND	0.00	1.34	0.0	LOWEST
Brownsville, TX	0.00	1.56	0.0	LOWEST

Note (1): Marquette, MI moved to a new location in 1979, so record amounts are based only on the last ten years.

Note (2): Precipitation amounts for Del Rio, TX start in 1963.

TABLE 6. RECORD APRIL EXTREME TEMPERATURES.

Station	Extreme (Degree F)	Record Type
Sacramento, CA	93	HIGHEST
Montgomery, AL	91	HIGHEST
Key West, FL	89	HIGHEST
Honolulu, HI	89	HIGHEST
Nome, AK	51	HIGHEST

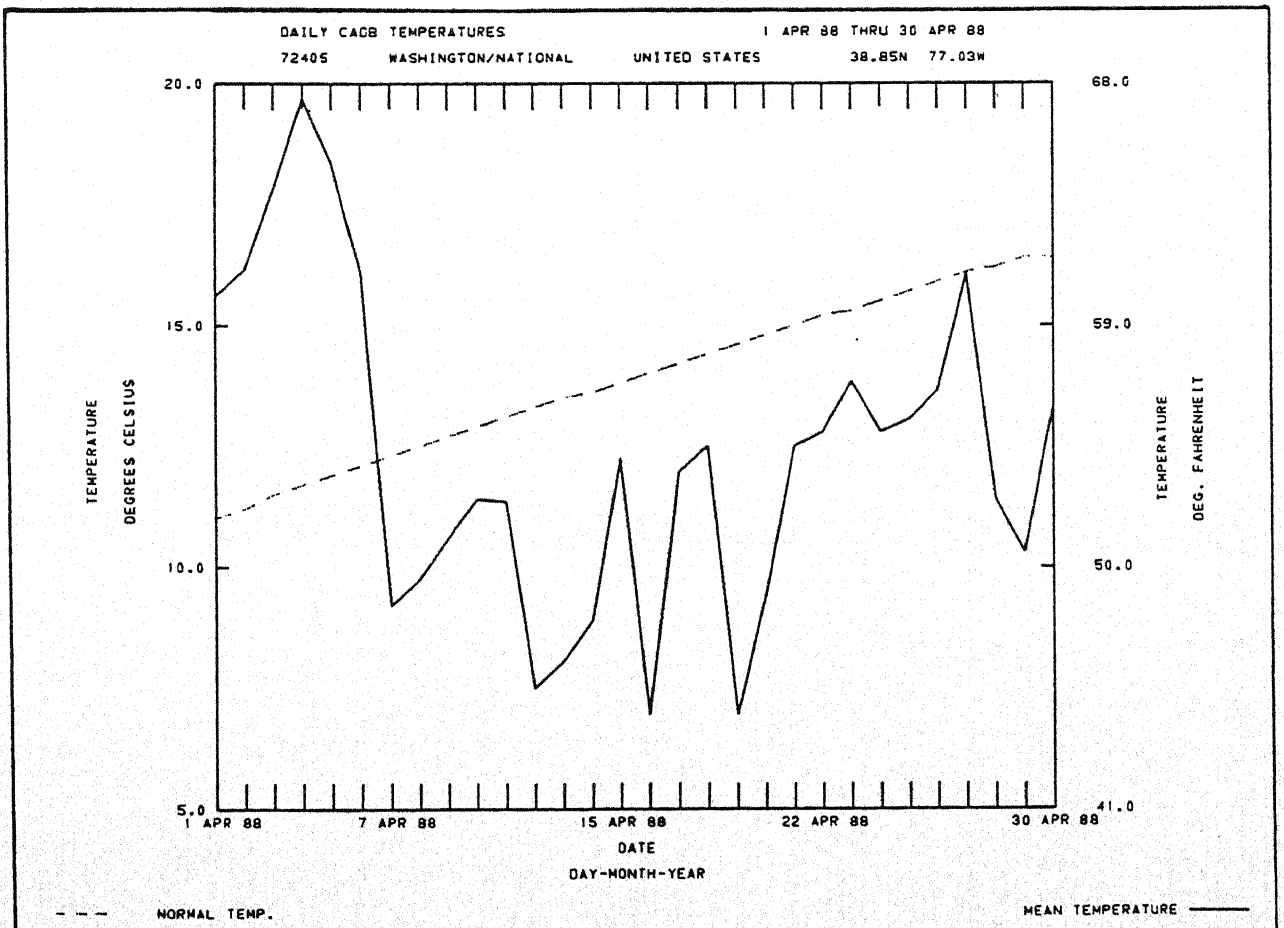
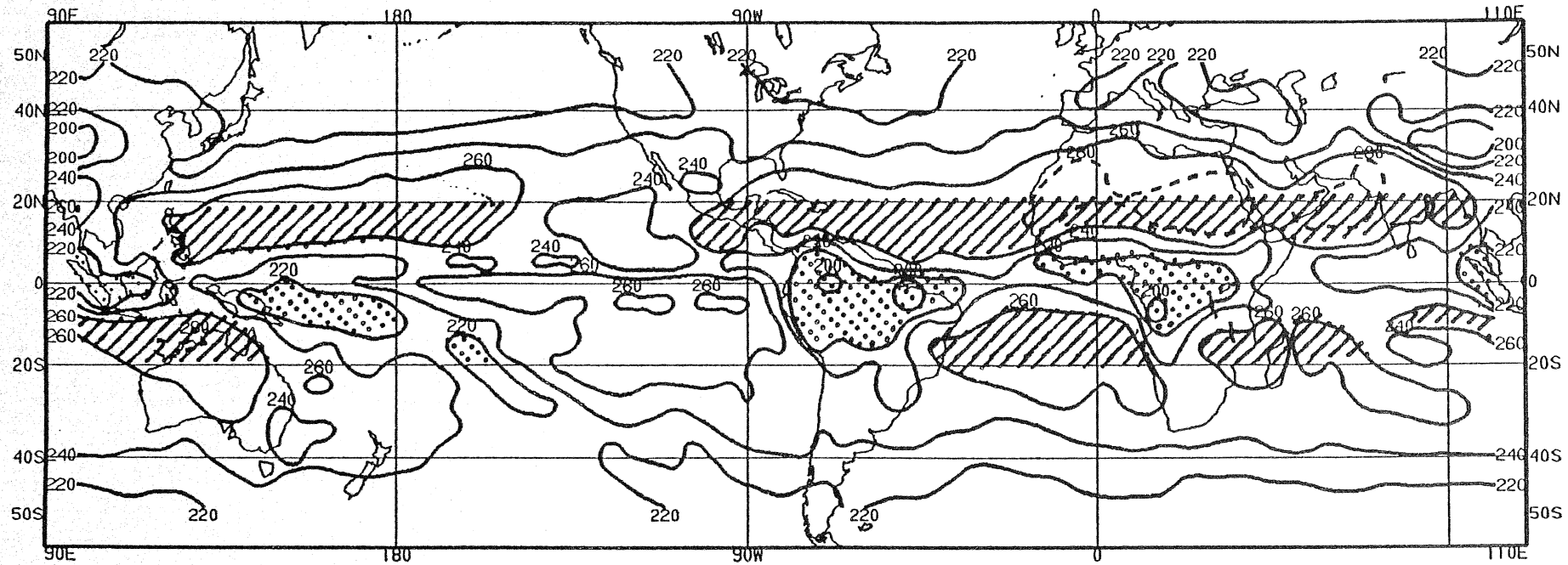


Figure 4. Daily normal versus observed average temperatures during April, 1988 for Washington, D.C. Even though April's departure only averaged to be -2.3°F, the majority of the month (23 days) was at or below normal.



MEAN OUTGOING LONGWAVE RADIATION - WATTS/M**2 1 APR 88 THRU 30 APR 88

TROPICAL OLR LESS THAN 220, PRECIPITATION LIKELY

TROPICAL OLR GREATER THAN 260, PRECIPITATION UNLIKELY

The above map depicts the mean monthly value of outgoing long wave radiation (OLR) as measured by the sensor on board the polar orbiting satellite. In tropical areas that receive primarily convective rainfall, a mean OLR value of less than 220 watt/m^2 is associated with significant monthly precipitation, whereas a value greater than 260 watt/m^2 normally indicates little or no precipitation.

Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non-convective, or in some tropical coastal or island locations, where the precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitation amount does not necessarily hold in such locations.